Boone County Thoroughfare Plan

Prepared For:

Boone County Commissioners

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BOONE COUNTY THOROUGHFARE PLAN

Introduction

The Boone County Thoroughfare Plan is a county-wide transportation study and thoroughfare plan. The project work to develop the plan included the collection of data necessary to analyze the movement of vehicular traffic throughout the county. Data collection included the gathering of information regarding traffic counts, other transportation-related studies and plans, roadway pavement conditions and general roadway inventory information.

The Thoroughfare Plan represents an overall community vision for the future. Public input was generated through community wide meetings and advisory committee meetings. Additional discussions regarding the plan took place during numerous meetings with city and community leaders and officials, and utility officials. The goals and objectives contained within the Thoroughfare Plan are based on this public input.

Traffic and land use growth projections were conducted based upon the data collection and the previously adopted Boone County Comprehensive Plan. The details of all analysis, calculations and assumptions are included in the following chapters of this report.

The study area consists of all transportation routes within the boundaries of Boone County, up to the incorporated city limits. The transportation plan is intended to anticipate the future needs of the roadway system by developing an improvement strategy for five, ten, and 20 year planning horizons. This plan offers a county-wide look at the overall network and will aid in the efforts of the county to plan future improvements. Using this plan will establish a movement pattern of vehicular traffic throughout the county by identifying the future traffic needs that will help insure a continued healthy, safe and beneficial living environment for the citizens of Boone County.

CHAPTER I: Data Collection

Boone County is located to the northwest of the City of Indianapolis in Indiana. Figure 1.1, "Area Location Map", illustrates the exact location of the county. At this time, the population of the county is estimated to be approximately 40,000 people. The majority of the county is generally rural in character and primarily agricultural, though the southeast portion of the county is experiencing a surge in growth from Indianapolis. The county contains six incorporated areas. These incorporated areas are as follows:

- Lebanon,
- Zionsville,
- Whitestown,
- Jamestown,
- Thorntown, and
- Advance.

Roadway systems are often grouped into a number of different functional classifications for administrative, planning, and design purposes. These groupings typically carry with them a set of suggested minimum design standards which are in keeping with the importance of the system and are governed by the specific transportation services the system is expected to provide. The primary reason to classify roadways into systems are the travel needs of the public based on existing and expected future land use and overall continuity. In Boone County there are five types of roadway classifications. They are as follows:

- *Interstate*
- *Minor Arterial*
- *Major Collector*
- *Minor Collector*
- *Local*

Definitions for each of these terms are included in the attached Glossary.

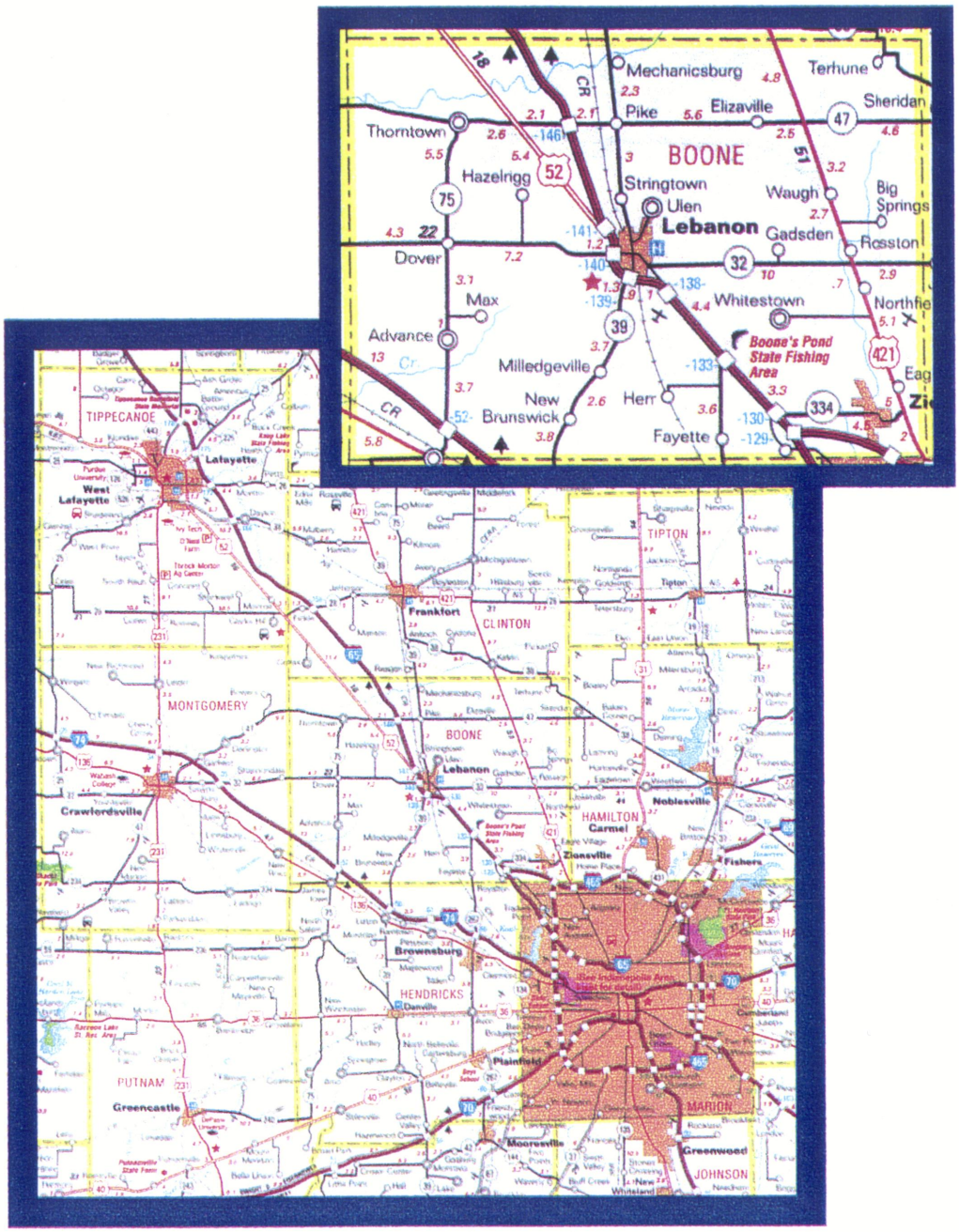
Interstate 65 (I-65) is the major *interstate* roadway traveling through the county. I-65 is the primary corridor carrying traffic from Indianapolis to Chicago, Illinois. I-65 travels in the northwest direction through the county and the City of Lebanon. Interstate 74 (I-74) also passes through the western corner of the county and carries traffic from Indianapolis to Peoria, Illinois. Boone County contains two *minor arterial* roadways:

- SR 32, which travels east to west through the county primarily connecting Noblesville and Westfield in Hamilton County to Lebanon and then into Montgomery County. This arterial bisects Lebanon.
- SR 267, runs north to south and connects Hendricks County to I-65.

There are several major and minor collector throughout the county. Figure 1.2, "Existing Functional Classification", illustrates these roadways and their associated classifications.

BOONE COUNTY THOROUGHFARE PLAN

AREA LOCATION MAP



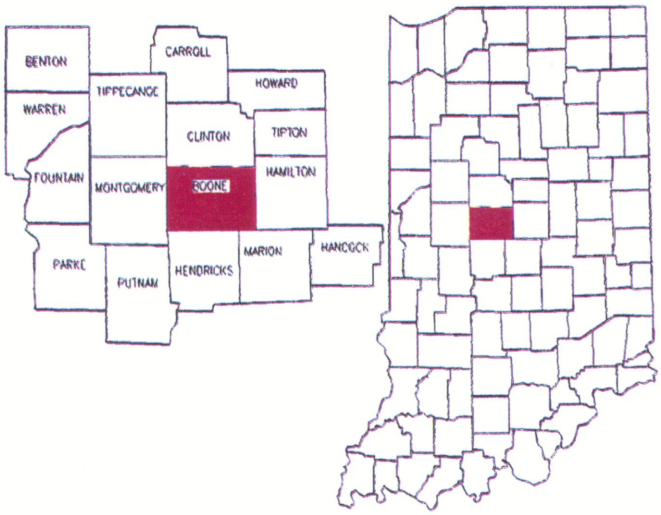
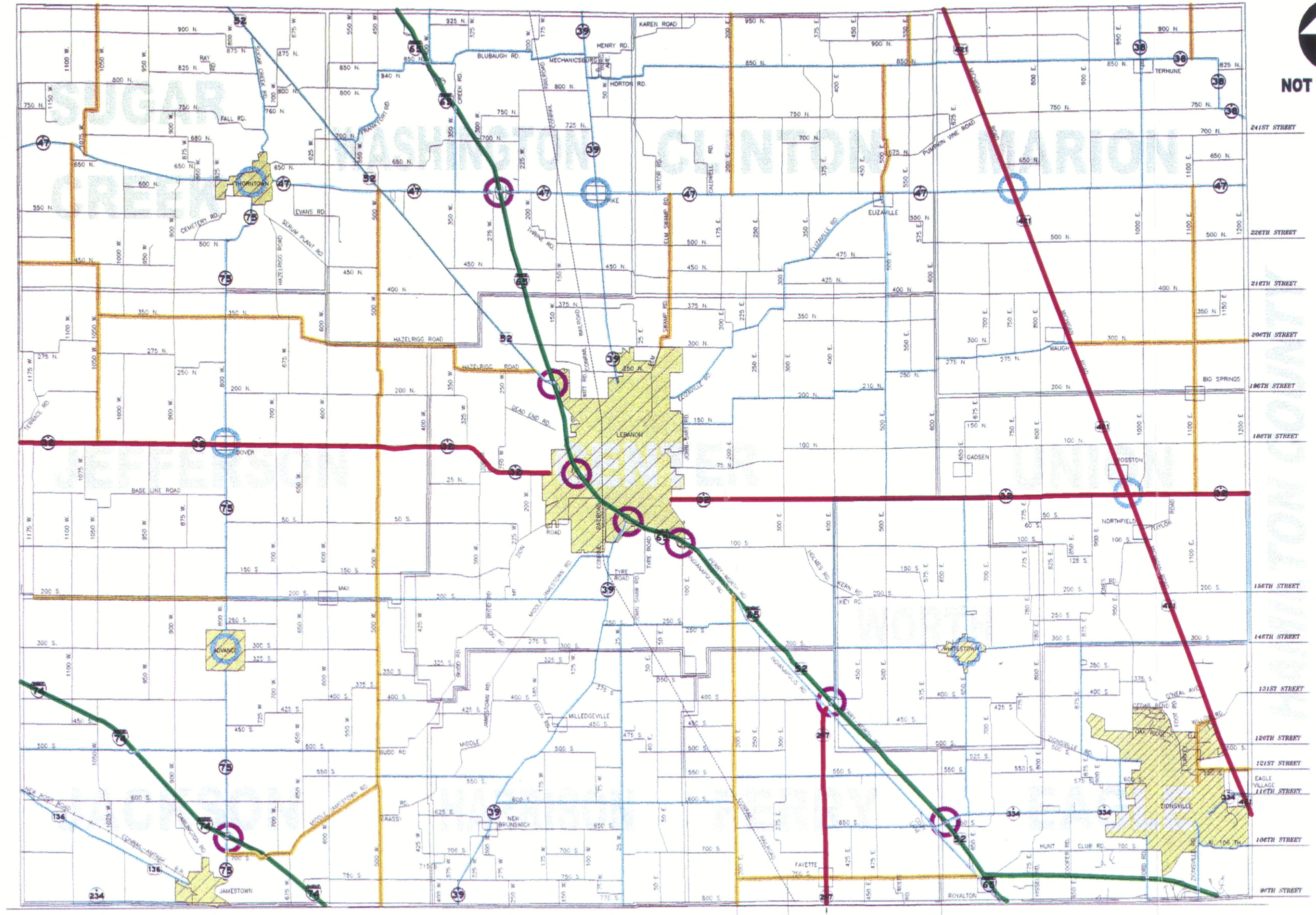


FIGURE 1.1

BOONE COUNTY THOROUGHFARE PLAN
FUNCTIONAL CLASSIFICATION

NOT TO SCALE



LEGEND

- INTERSTATE/FREEWAY
- MINOR ARTERIAL
- MAJOR COLLECTOR
- MINOR COLLECTOR
- INTERCHANGE
- MAJOR INTERSECTION

FIGURE 1.2

1.1 Traffic Counts

In order to accurately analyze the county's transportation and roadway system demands, traffic counts were taken at various locations throughout the county. Approximately 470 locations were identified for county roadways at which 24-hour machine counts were collected. Twenty-four hour machine counts consist of data that is electronically collected over a 24-hour period showing the traffic volumes on the designated roadway. For the majority of this study, these counts defined the vehicles by type, car, truck, or other, and by direction. Roadway intersection turning-movement counts were collected for *peak traffic hours* at approximately 50 major intersection locations. These traffic counts consisted of the collection of specific vehicle movements, such as left and right-turns, at intersections over several hours chosen as the anticipated peak hour for the intersection. Figure 1.3, "Traffic Count Locations", illustrates the locations of the traffic counts collected and the associated site number. These traffic counts are summarized as *Average Annual Daily Traffic (AADT)* volumes in Appendix A: "Traffic Count Summary Sheets" and Figure 1.4, "Average Annual Daily Traffic". The *AADT* for a roadway segment is defined as the average vehicular traffic that can be expected on that segment, on average for any day of the year. This volume information is the most useful in this type of analysis. Details associated with these traffic counts, such as vehicle classification and peak hour data are located in Volumes II through VI at the County Highway Department for reference purposes.

Traffic counts were also obtained from the Indiana Department of Transportation (INDOT) for various state roadway segments. This information is presented only as *unidirectional* information and thereby does not distinguish traffic patterns between travel directions. This information could therefore only be utilized to assist in establishing background traffic patterns.

BOONE COUNTY THOROUGHFARE PLAN
TRAFFIC COUNTS

NOT TO SCALE

**NOTE: LOCATIONS ARE APPROXIMATE

LEGEND

- PRIMARY TUBE COUNT LOCATIONS
- SECONDARY TUBE COUNT LOCATIONS
- X INTERSECTION TURN MOVEMENT COUNT

FIGURE 1.3

BOONE COUNTY THOROUGHFARE PLAN
AVERAGE ANNUAL DAILY TRAFFIC

NOT TO SCALE

SUGAR CREEK
WASHINGTON
CLINTON
MARION
JEFFERSON
CENTER
UNION
WORTH
JACKSON
HARRISON
PERRY
EAST
HENDRICKS COUNTY

241ST STREET
226TH STREET
216TH STREET
206TH STREET
196TH STREET
186TH STREET
176TH STREET
166TH STREET
156TH STREET
146TH STREET
131ST STREET
126TH STREET
121ST STREET
116TH STREET
106TH STREET
96TH STREET

THORNTOWN
DOVER
LEBANON
ADVANCE
JAMESTOWN
MILLEDGEVILLE
NEW BRUNSWICK
WHITESTOWN
ZIONSVILLE
ROYALTON
TERHUNE
ELIZABETHVILLE
GADSEN
HOSSTON
NORTHFIELD
BIG SPRINGS
EAGLE VILLAGE
FAYETTE

PROPOSED NORTH-SOUTH CORRIDOR TO I-74

AVERAGE ANNUAL DAILY TRAFFIC

- <100
- 100-500
- 501-1000
- 1001-2000
- 2001-3000
- 3001-4000
- >4000
- XXXXX ACTUAL AVERAGE ANNUAL DAILY TRAFFIC

FIGURE 1.4

1.2 Data Sources

The Boone County Comprehensive Plan was adopted by Boone County in 1998. This Plan is the official policy document which establishes development goals and objectives to guide growth throughout the county. The Plan shows proposed land use and zoning throughout the county. The Plan is intended to guide growth and development for the county. This Plan was utilized as a basis for determining future growth within the county for the transportation system analyses. The Lebanon Comprehensive Plan was also utilized to aide in establishing growth rates.

Census tracts and data or 1990 were obtained from the US Census Bureau. This data contained information regarding factors such as:

- population,
- income,
- number of dwelling units, and
- number of employees.

This information along with other relevant data, was utilized to calculate the number of *trip productions* and *attractions* throughout the county. *Trip attractions* relate to the trips generated by nonresidential land for various trip purposes, generally with home as the destination. *Trip productions* reflects the number of trips generated at home. The census data is included in Volume I: "Census Data", of the Boone County Thoroughfare Plan Data stored at the County Highway Garage.

Nationally accepted Long Range Transportation Forecasting standards from sources such as the *National Cooperative Highway Research Program (NCHRP) Report 365: Travel Estimation Techniques for Urban Planning*, 1998, were also utilized to analyze the Boone County transportation system. These standards included information that is vital to the traffic forecasting process.

1.3 Roadway Inventory

The Boone County highway department conducted an inventory of approximately 800 miles of roadway within the county's jurisdiction. This inventory included more than 1,300 individual roadway segments and detailed information regarding the severity and extent of roadway damage. This effort included the evaluation of pavement conditions along the segments as discussed further in Chapter III: Pavement Management System. The actual data sheets are included in Volumes VII through IX of the Boone County Thoroughfare Plan Data stored at the County Highway Garage. Boone County contains approximately 400 miles of paved roadway and approximately 400 miles of unpaved roadways for a total of 800 miles of roadway. Figure 1.5, "Roadway Conditions", shows these paved and unpaved roadway segments. This information was utilized for the pavement management system.

BOONE COUNTY THOROUGHFARE PLAN
ROADWAY CONDITIONS

NOT TO SCALE

SUGAR CREEK
WASHINGTON
CLINTON
MARION
JEFFERSON
UNION
JACKSON
HARRISON
PERRY
EAGLE
WORTH
HAMILTON COUNTY
HENDRICKS COUNTY

241ST STREET
226TH STREET
216TH STREET
206TH STREET
196TH STREET
186TH STREET
176TH STREET
166TH STREET
156TH STREET
146TH STREET
131ST STREET
126TH STREET
121ST STREET
116TH STREET
106TH STREET
96TH STREET

THORNTOWN
DOVER
ADVANCE
JAMESTOWN
LEBANON
MILLEDGEVILLE
NEW JERUSALEM
FAYETTE
ROYALTON
WHITESTOWN
ZIONSVILLE
OAK RIDGE
BIG SPRINGS
ROSSTON
NORTHFIELD
ELIZABETHTOWN
PIKE
TERHUNE
EAGLE VILLAGE

PROPOSED NORTH-SOUTH CORRIDOR TO I-74

LEGEND

PAVED ROADWAY SEGEMENTS

FIGURE 1.5

CHAPTER II: Community Involvement

A primary source for information regarding the county's transportation system involved community input. Five community (public) meetings, three citizens advisory (public) meetings, and numerous coordination meetings with local utility companies and other governing entities were conducted. Table 2.1, "Community Involvement/Coordination Meetings", presents a detailed list of these meeting dates and times. These meetings were utilized by the project team to ask citizens for their input and ideas regarding the county transportation system, and to coordinate planning activities with utilities and other agencies. It should be noted that those meetings shown in Table 2.1 with an asterisk (*) indicate coordination meetings that were not advertised as "public" meetings. A summary of items discussed is, however, included in Appendix B, "Meeting Information", for reference. A newsletter was also compiled to inform citizens of the process. Copies of meeting agendas, sign-in sheets, handouts and meeting minutes are also included, as available, in Appendix B as well.

Table 2.1
Community Involvement/Coordination Meetings

Date	Topic	Location
22-Jun-98	Citizen Advisory Committee	Boone County Jail Meeting Room
*25-Aug-98	*Discuss the Role of the MPO in Boone County	*Indianapolis Dept. of Metropolitan Development, Division of Planning
26-Aug-98	Community Meeting	Boone County 4-H Fairgrounds Meeting Room
*08-Sep-98	*INDOT Projects in Boone County	*State Office Building
05-Oct-98	Community Meeting	Western Boone High School
08-Oct-98	Community Meeting	Zionsville Town Hall
14-Oct-98	Community Meeting	Boone County Jail Meeting Room

Date	Topic	Location
*07-Jan-99	*Discuss Utility Expansion Plans	*Boone County Utilities, LLC
*12-Jan-99	*Discuss City of Lebanon Utility Expansion Plan	*Lebanon Utilities Office
*21-Jan-99	*Discuss Utility Expansion Plans	*Indianapolis Water Company
*21-Jan-99	*Discuss Utility Expansion Plans	*Jamestown Utilities Office
*03-Feb-99	*Discuss Utility Expansion Plans	*Zionsville Utilities Engineer's Office
29-Mar-99	Citizen Advisory Committee	Boone County Jail Meeting Room
19-Apr-99	Community Meeting	Boone County Jail Meeting Room
*22 April 1999	*Discuss Revised Utility Expansion Plans and ROW Dedication Requirements	*Boone County Utilities, LLC

CHAPTER III: Roadway Management Systems

A Roadway Management System (or RMS) is a logical, fact-based decision-making tool which assists in selecting and prioritizing road or street improvements. The RMS is an extension of the pavement evaluation, which has been completed for the County. Generally, a RMS can be in the form of a hand written log or maps, or it can be in a spreadsheet based format, an off-the-shelf software program, or a software program developed specifically for a client by a software developer. Whatever type of format the system is in, the basic theories which are the basis for such roadway management systems are still the same. They are, however, typically very different than those used in normal road priority logic. Most, probably, the greatest difference between a RMS and those methods "normally" used by public decision-makers is the philosophy. In the past (or still present in many cases) most budgets and decisions regarding roadway improvements have been based upon such factors as:

- The amount of the previous year's budget,
- A standard program (seal coat every five years, pave every ten),
- The "squeaky wheel",
- The "worst first",
- The "gut-feel" of employees, or
- even political pressure.

A RMS, conversely is based upon a different logic. The basic theory typically utilized in a RMS is that it is far more cost-effective to maintain a roadway in good condition than to repair one in poor condition, or more simply: *"keep the good streets in good condition"*. At the same time, the program addresses the needs of the worst roads, but does not pour all of the available budget into repairing these worst roads.

This theory is best described by the "Pavement Management Curve" (see Figure 3.1, "Pavement Management Curve") where a Pavement Condition Index (PCI) varies at a certain rate in accordance with time. The Pavement Condition Index is a numerical indicator of the present condition of a roadway pavement, normally registering as a higher indices of a better condition and a lower index or a worse condition. Early in the life of a pavement the roadway is in good condition (i.e. a PCI of 100) and little or no maintenance is required. As time passes, however, preventative maintenance is necessary to extend or improve the condition. In fact, pavement management requires this, because the longer a roadway is without maintenance, the higher the costs are to improve the roadway. Another correlation of the "Pavement Management Curve" is the cost of improvements. The Costs for Improvement could be substituted for the PCI, thus indicating that the longer the duration between maintenance periods and the greater the time delay, the more expensive the ultimate repair will be. The steeper, or middle part, of the curve indicates rapid deterioration over a short span of time. This results in roadway segments which should be considered as a high priority, since the cost will be much higher in the subsequent year to repair. The lower end of the curve denotes that, at some point, it is not cost effective to perform any repair at that time, as the cost for repair does not substantially change from year to year and the repair alternative is the same: significant. These roads, however, will require reconstruction or considerable rehabilitation at some

point in time, in order to continue to meet the needs of the public.

The road evaluation analysis and ratings, as well as the traffic count compilation performed as a part of this project, are integral building blocks in the development of a Roadway Management System. This basic data which was compiled includes:

- road name,
- section number,
- maintenance jurisdiction,
- roadway segment length,
- year inventoried,
- intersecting roads at beginning and end of segment,
- traffic volume,
- township,
- importance,
- pavement surface type, and
- pavement condition ratings.

This data was entered into a computer software program developed for the United States Department of Transportation Federal Highway Administration, similarly called "Road Surface Management System 98" (RSMS98). Volumes have been written describing the development and logic behind this program. Briefly described, however, the program integrates the data which has been compiled and entered and analyzes the pavement condition ratings in order to produce the Pavement Condition Index (PCI) for each road segment. The resulting distribution of the PCI for the Boone County roadway system is shown in the chart: "Relative Distribution of Roadway Segment Condition" as given in Appendix C: Pavement Management System. The software will also function as a fully operational Pavement Management System. It does not, however, allow for the incorporation of further data in the database and does not easily correlate the typical pavement repair and maintenance scenarios which are currently utilized by the Boone County Highway Department.

The Pavement Condition Index, as well as all the base roadway data, was therefore, translated into a basic database format and incorporated into *Microsoft Excel* spreadsheet software for further analysis. Standard spreadsheet tools or functions were utilized to develop specific formulas for the analysis of the roadway data. These formulas integrated the various factors, such as importance and traffic volume, which were correlated with the PCI rating to develop a "Weighted Index" for each road segment. (See "Pavement Management Criteria" chart in Appendix) This index places higher prioritization upon higher volume roads as well as those with a greater functional classification. Thus, a roadway having a traffic volume of 1000 vehicles per day, and a functional classification as a collector road, will have a greater Weighted Index than a local road with only 500 cars per day and the same PCI rating. (See "Relative Distribution of Weighted Index" chart in Appendix C: Pavement Management) In order to further incorporate pavement management theory into the analyses, two different Weighted Index formulas were developed to provide for proper repair scenarios. The roadway segments were separated into two categories of repair:

- maintenance, and

- rehabilitation/reconstruction.

The categories correlate directly with the PCI rating and are separated at an index value of 60, in accordance with the standard pavement management curve. The priority of any given segment was then based upon the Weighted Index and a priority listing could be output for both the maintenance and the rehabilitation categories.

The same spreadsheet tools were also utilized to develop formulas which analyzed the current roadway surface type in conjunction with the Weighted Index and the road repair or improvement types, as given in the Boone County Highway Department Estimated Road Project Costs report for 1999. The result was a suggested roadway improvement option or maintenance alternative for each roadway segment. The suggested option as given is only a general scenario based upon the average condition of the segment. The suggested alternative should be correlated and modified through an in-field review by experienced personnel to result in actual bid type solutions.

The costs as delineated and developed by the highway department in the above mentioned report were also utilized in the program. The costs for each individual repair or improvement type were incorporated with the suggested improvement option and the segment length to result in an estimated cost for the improvement of that section of roadway. Cumulative costs were then compiled based upon the priority listing. Comparison between the available budget and the cumulative costs can then occur. Decisions regarding the percentage of the budget which will be expended on maintenance and on rehabilitation should then be made. This will ultimately result in a listing of roadways which would be further analyzed for bidding purposes for the annual paving and repair program. Three priority listings of the complete data set have been plotted and are included in the Appendix. These are "Road Management Program Database & Pavement Evaluation Priority" by Township, by Maintenance priority and by Rehabilitation priority.

Additionally, a Roadway Management System typically also includes a broader range of data which is analyzed to better pin-point and prioritize the needs of the roadways with the most cost-effective methods possible. For example, categories containing past maintenance or improvement records which document the date when the facility was last "chip sealed" or paved and the type of improvement are often included in the roadway management database. Also, records such as the condition ratings for the past five years are typically utilized as a part of the analysis. The standard spreadsheet software in which the database resides is easily expandable to include these and other records. It would be recommended that maintenance histories and annual pavement evaluations be compiled and integrated into the database and kept current. Further formulization could thence incorporate this additional information to better prioritize the proposed roadway improvements. The current system however, is easily usable and allows for variation in factor weights for changing priorities, additional maintenance options such as crack sealing, etc., as well as ease of upkeep and periodic modification. Roadways may be added or deleted as annexation occurs or categories added to further develop the system.

Boone County has taken a significant step forward in the professionalization roadway improvement

priorities. A fact-based tool which integrates uniformity as the basis for determining these priorities creates a positive solution to the problematics of roadway maintenance. The public official is forthrightly able to describe the basis for the improvement decision-making and the public is well served. Utilized appropriately, the Roadway Management System will be an useful and productive tool in the long-range improvement of the Boone County roadway system.

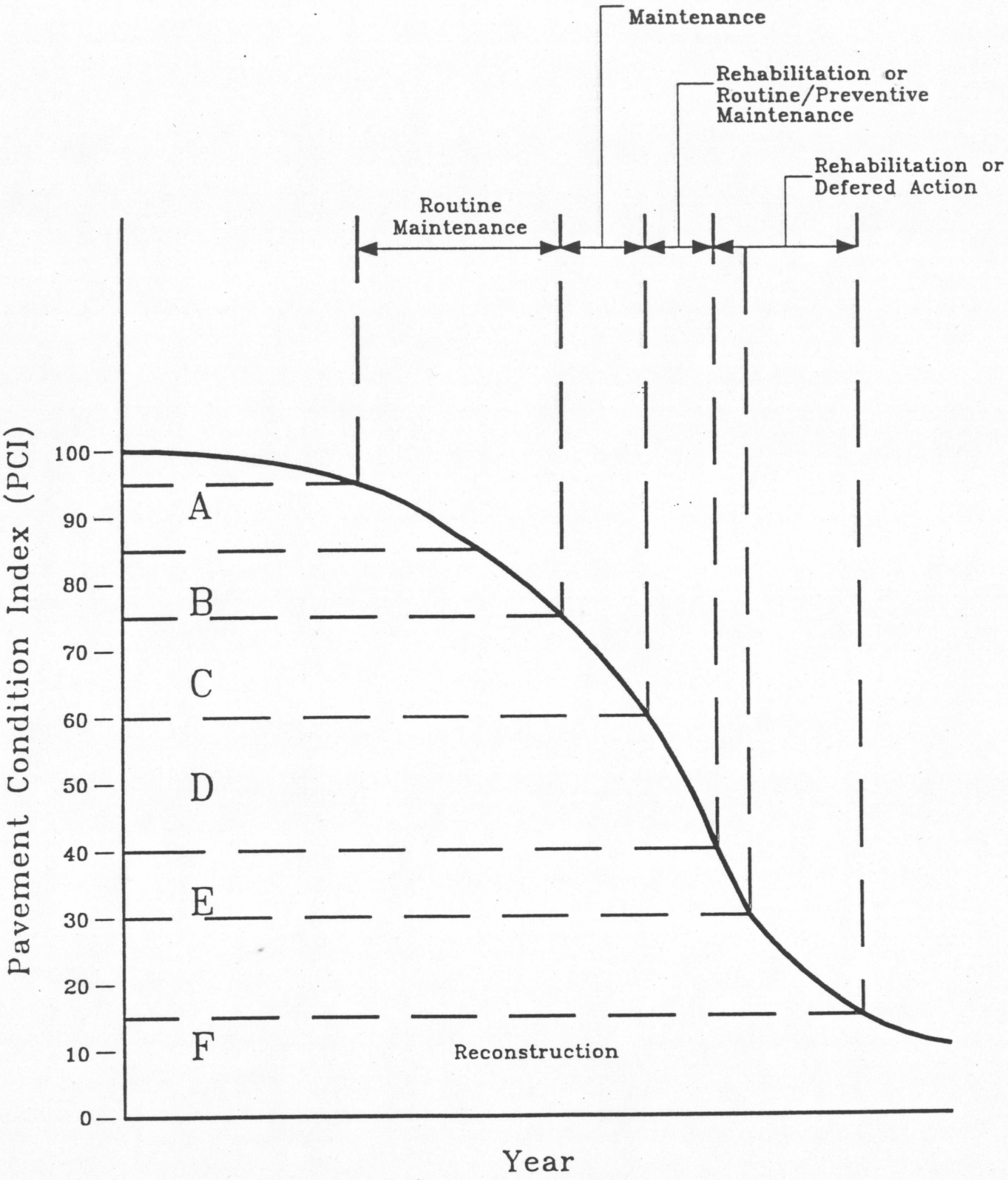


Figure 3.1
Pavement Management Curve

CHAPTER IV: Traffic Analysis

4.1 Existing Land Use

The transportation system analysis centered around the adopted Boone County Comprehensive Plan and the proposed land use associated with that plan. Boone County is rural in nature and under the Comprehensive Plan, the majority of the county is zoned for agricultural space. The primary growth areas center around the cities and towns such as, Zionsville and Lebanon. These areas are zoned for residential, commercial, and industrial. A map illustrating the land uses by color is shown in Figure 4.1, "Existing Land Use". The City of Indianapolis is rapidly expanding into the surrounding counties. Boone County is experiencing these affects and has rezoned specific areas in the southeast portion of the county, specifically along Indianapolis Road and 650 South, to accommodate the rapid growth. This area around I-65 has been zoned for commercial, residential, and industrial use. Existing land uses, as of November 1998, were utilized for this analysis. It should be noted that deviations in these land uses are anticipated to occur, but could not be accommodated in this analysis.

BOONE COUNTY THOROUGHFARE PLAN
EXISTING LAND USE

NOT TO SCALE

AGRICULTURAL
RESIDENTIAL- NO SERVICES
RESIDENTIAL - WITH SERVICES
DESIGNATED DEVELOPMENT AREA
COMMERCIAL
INDUSTRIAL
AIRPORT
RECREATION AND CONSERVATION

FIGURE 4.1

4.2 Existing Socioeconomic Data

Existing socioeconomic factors were also primary data sources for the transportation system analysis. The census data was divided into five census tracts of information. These tracts were too large to analyze the Boone County transportation network effectively. These five tracts were thereby subdivided in 63 *Traffic Analysis Zones (TAZs)*. The *traffic analysis zone* boundaries were first determined by the census tract boundaries and then from the land uses based on the Comprehensive Plan. A map showing these specific *TAZs* is shown in Figure 4.2, "Traffic Analysis Zones". The land uses, depicted in the Comprehensive Plan, contain certain characteristics that are unique to that particular land use. An example of this would be, a residential area will contain dwelling units but not necessarily retail employees. A commercial district will mostly contain retail and non-retail employees but not likely many dwelling units. Because of this, the actual census data could be distributed throughout the *TAZs*. Table 4.1, "Socioeconomic Data", details the census data distributed by *TAZ*.

Table 4.1
Socioeconomic Data

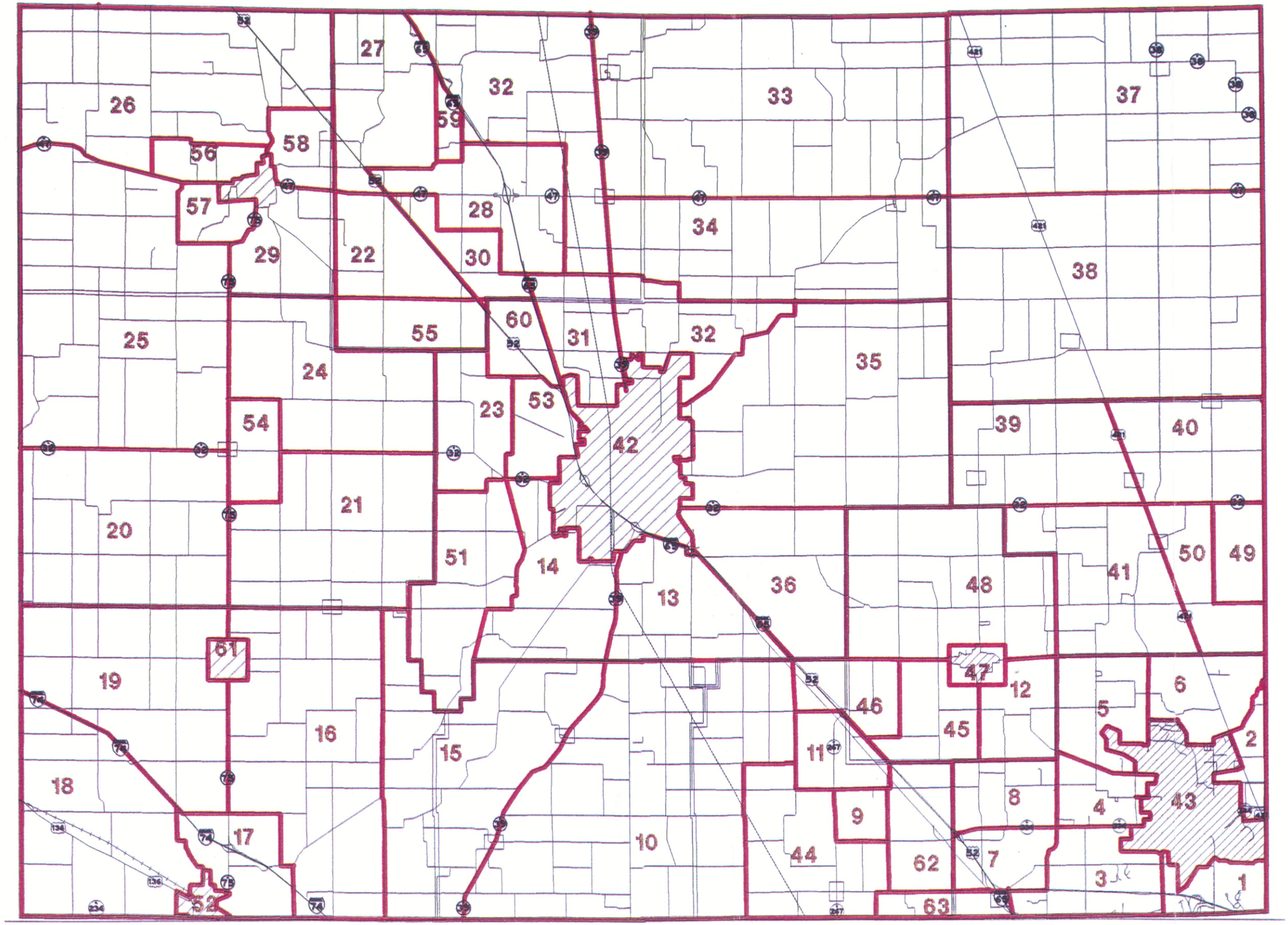
Zone	Income (1,000's)	No. of Retail Employees	No. of Non-Retail Employees	No. of Dwelling Units
1	50.145	60	307	266
2	50.145	35	250	266
3	51.798	43	58	163
4	51.798	43	58	163
5	51.798	43	58	163
6	50.145	35	250	266
7	51.798	43	58	163
8	51.798	43	58	163
9	35.675	35	55	112
10	32.432	32	55	112
11	38.918	32	50	112
12	39.951	23	40	76
13	36.199	33	83	113
14	40.221	30	75	102
15	29.189	32	50	112
16	29.189	30	45	103
17	29.189	30	45	103
18	29.189	30	45	103
19	29.189	30	40	95

Table 4.1
Socioeconomic Data

Zone	Income (1,000's)	No. of Retail Employees	No. of Non-Retail Employees	No. of Dwelling Units
20	30.200	31	33	113
21	30.200	31	33	113
22	34.101	21	39	110
23	40.200	33	83	113
24	30.200	29	30	102
25	30.200	31	33	113
26	30.200	29	30	102
27	34.101	19	35	100
28	34.101	23	43	120
29	30.200	31	33	113
30	34.101	21	39	110
31	40.200	33	83	113
32	34.101	23	43	120
33	34.101	19	35	100
34	34.101	19	35	100
35	44.243	36	91	124
36	44.243	36	91	124
37	34.101	17	31	90
38	34.101	17	31	90
39	39.951	20	35	67
40	39.951	20	35	67
41	39.951	23	40	76
42	25.100	1701	2744	4549
43	50.145	433	1237	1019
44	35.675	35	60	123
45	39.951	26	44	85
46	39.951	26	44	85
47	39.951	23	40	76
48	39.951	23	40	76
49	39.951	23	40	76
50	39.951	23	40	76
51	36.199	30	75	102

Table 4.1
Socioeconomic Data

Zone	Income (1,000's)	No. of Retail Employees	No. of Non-Retail Employees	No. of Dwelling Units
52	25.946	28	5	123
53	40.200	33	83	113
54	30.200	31	33	113
55	34.101	21	29	110
56	30.200	35	39	135
57	30.200	31	33	113
58	30.200	31	33	113
59	34.101	9	25	50
60	40.200	33	83	113
61	32.432	32	50	112
62	38.918	35	55	123
63	35.675	35	55	123



NOT TO SCALE

BOONE COUNTY THOROUGHFARE PLAN
TRAFFIC ANALYSIS ZONES (TAZ)

FIGURE 4.2

4.3 Traffic Model

A computerized model of the Boone County roadway network was created utilizing the data sources outlined in Chapter II: Data Collection, the existing Land Use Plan, and existing Socioeconomic Data. *Quick Response System II (QRSII)*, a transportation modeling software program, was utilized to create the computerized model. This model was calibrated to match the collected existing traffic counts to within 20%, which is the normal standard for such modeling efforts. Calibrating the network to less than 20% actually increases the error in the model.

4.4 Growth Rate

A *background growth factor* was established for the roadways that enter and exit at the county's borders. These roadway segments are known as *external stations*. Background growth is defined as the amount of growth that an area can expect to experience over a given length of time. This growth comes from various sources and can be negative if the area experiences a decrease in population or traffic. This growth factor does not consider the future growth or expansion of the study area. For the transportation analysis model, the background growth does not consider the growth within Boone County jurisdictions, except within incorporated city limits. The future growth for Boone County is considered at a later point in the analysis process. The background growth considers the growth for areas such as the City of Indianapolis and incorporated areas within the county, such as Zionsville and Lebanon. This factor was established utilizing data collected from previous years. Table 4.2, "Background Trips", details the calculated growth factors for various areas and the vehicle trips associated with that area by socioeconomic factor.

Table 4.2
Background Trips

Town	Growth Rate (%/year)			Total Retail		
	5 Years	10 Years	20 Years	5 Years	10 Years	20 Years
Thorntown	6%	5%	4%	47	60	88
Lebanon	8%	6%	4%	2499	3345	4951
Zionsville	7%	6%	4%	607	813	1203
Whitestown	3%	5%	5%	27	34	55
Jamestown	8%	6%	4%	41	55	81

Town	Total Non-retail			Total Dwelling		
	5 Years	10 Years	20 Years	5 Years	10 Years	20 Years
Thorntown	52	67	99	181	231	341
Lebanon	4032	5396	7987	6684	8945	13240
Zionsville	1735	2322	3437	1429	1913	2831
Whitestown	46	59	96	88	112	183
Jamestown	7	10	15	181	242	358

4.5 Growth Scenarios

Once the background growth factor was established, three *growth scenarios* were developed. These scenarios were based on the existing land uses as designated by the county Comprehensive Plan. Each growth scenario was establish for each of three planning horizon years. The scenarios were projected for the years 2004, 2008 and 2018. These growth scenarios are detailed below:

- **Scenario 1: Low Growth**

The low growth scenario is intended to illustrate the growth that the county will undoubtedly, and at a minimum, experience. This scenario includes only parcels that have already been platted as of the date that this study was conducted. While this scenario may be unrealistic, it provides a solid base scenario for comparison purposes.

- **Scenario 2: Moderate Growth**

This scenario is intended to illustrate a more realistic approach to the growth patterns that the county should expect to experience. For this scenario, the existing Land Use Plan was utilized to identify areas that are currently being considered for development. Several meetings were also held with the county planners to discuss which areas are most likely to

be developed within the next 20 years. This scenario analyzes areas within which there is moderate growth potential.

- **Scenario 3: High Growth**

  This scenario is intended to represent the results of fully "building-out" the areas defined within the existing Land Use Plan. This scenario analyzed areas that have any type of growth potential. This scenario considered factors such as the complete development of a large theme park near Thorntown, at the former "Old Indiana Theme Park" site.

Each of the three scenarios were forecast for three planning horizon years. These horizon years of five, ten, and 20 years are intended to provide the county with an analysis of the immediate, short term (five years), the intermediate (ten years), and the long term (20 years) needs. For each scenario and each horizon year, a percentage of *build-out* was defined. Build-out describes the amount of an area that is developed. Table 4.3, "Percentage Build-out", describes the percentage build-out for each scenario. Note that full build-out is considered to be 80% since there will always be some open space.

Table 4.3
Percentage Build-out

	Horizon Year		
Scenario	**5**	**10**	**20**
Low	5%	10%	20%
Moderate	20%	30%	60%
High	40%	50%	80%

With these growth scenarios established, the number of new trips generated could be determined by TAZ zones. Tables 4.4 through 4.6, "Trip Generation", shows the calculations for each zone and the total number of new trips for each growth scenario.

With the new trips established, the QRSII computer model was updated and reinitiates. The model added the new trips to the appropriate roadways within the network. The model is designed to distribute these new trips appropriately, based on some logical criteria. Specifically, the model chooses the shortest vehicle path to select the route through which vehicles will travel. This shortest path is time based and may not necessarily be the shortest distance traveled. Through this process, the model calculates the capacity of each segment of roadway and each intersection. As an intersection or roadway link approaches capacity, the *travel time* for vehicles at that intersection or along that link is increased. As travel time along one trip path exceeds the travel time along another vehicle path, vehicles are diverted to the shorter path. Many iterations of the computer program must be conducted until a state of equilibrium is reached within the program. The result of the traffic

analysis is a proposed traffic volume map. Sample maps for the high growth scenario for the years 2008 and 2018 are shown in Figures 4.3 and 4.4, "2008 and 2018 High Growth Scenario". From this map, problem areas and areas of heavy congestion can be identified.

Table 4.4
Trip Generation
Low Growth Scenario (will definately occur)

Township	Area Des.	Zone	Land Use	Zoning Density	Size	Unit	% Developable	Total Area Developable	Ratio	Pertinent Units			Comments
									PU**/acre	5 Years 40%	10 Years 60%	20 Years 80%	
Eagle	A25	Z7	Residential w/ Services	R2	476.4	Acres	60%	285.8	1.8	200	300	400	
	A25A	Z7	Residential w/ Services	R2	460.0	Acres	60%	276.0	1.8	193	290	386	
Perry	A19	Z11	Industrial		152.1	Acres	65%	98.9	16.9	668	1002	1337	

*Pertinent Units would be Dwelling Units, Retail, or Non-Retail Employees
**PU = Pertinent Unit

Table 4.5
Trip Generation
Moderate Growth Scenario (most likely to occur)

Township	Area Des.	Zone	Land Use	Zoning Density	Size	Unit	% Developable	Total Area Developable	Ratio	Pertinent Units			Comments
									PU**/acre	5 Years 10%	10 Years 30%	20 Years 60%	
Eagle	A26	Z8	Residential w/ Services	R2	287.0	Acres	80%	229.6	1.8	40	121	241	
	A28	Z4	Residential w/ Services	R2	964.2	Acres	80%	771.4	1.8	135	405	810	
		Z5	Residential w/ Services	R2	1159.3	Acres	80%	927.4	1.8	162	487	974	
		Z3	Residential w/ Services	R2	516.5	Acres	80%	413.2	1.8	72	217	434	
	A30	Z1	Residential w/ Services	R2	51.7	Acres	80%	41.4	1.8	7	22	43	
	A31	Z1	Residential w/ Services	R2	212.4	Acres	80%	169.9	1.8	30	89	178	
	A36	Z6	Residential w/ Services	R2	1256.9	Acres	80%	1005.5	1.8	176	528	1056	
	A23	Z8	Industrial		969.9	Acres	65%	630.4	16.9	1065	3196	6393	
	A22	Z63	Residential	R1	229.6	Acres	75%	172.2	0.3	6	17	34	
	A24	Z8	Residential	R1	68.2	Acres	75%	51.2	0.3	2	5	10	
	A27	Z4	Residential	R1	332.8	Acres	80%	266.2	0.3	9	27	53	
		Z5	Residential	R1	918.3	Acres	80%	734.6	0.3	24	73	147	
	A29	Z3	Residential	R1	1245.4	Acres	75%	934.1	0.3	31	93	187	
	A35	Z5	Residential	R1	45.9	Acres	80%	36.7	0.3	1	4	7	
Perry	A19	Z46	Industrial		71.8	Acres	65%	46.7	16.9	79	237	473	1/2 Comm
	A20	Z62	Industrial		694.4	Acres	65%	451.4	16.9	763	2288	4577	
	A19	Z11	Commercial		152.1	Acres	50%	76.1		N/A	N/A	N/A	1/2 Ind
			Restaurant			60%	split	45.6	30.6	139	418	837	
			Gas Station w/Market			40%	split	30.4	5.0	15	46	91	
		Z46	Commercial		71.8	Acres	50%	35.9		N/A	N/A	N/A	
			Restaurant			60%	split	21.5	30.6	66	197	395	1/2 Ind
			Gas Station w/Market			40%	split	14.4	5.0	7	22	43	
	A21	Z62	Residential w/ Services	R1	487.9	Acres	80%	390.3	0.3	13	39	78	
		Z63	Residential w/ Services	R1	401.7	Acres	80%	321.4	0.3	11	32	64	
	A21A	Z9	Residential w/ Services	R2	853.9	Acres	80%	683.1	1.8	120	359	717	
Worth	A20A	Z11	Industrial		111.9	Acres	65%	72.7	16.9	123	369	738	
	A17	Z46	Industrial		114.8	Acres	65%	74.6	16.9	126	378	757	
	A20A	Z11	Commercial		111.9	Acres	65%	72.7		N/A	N/A	N/A	
			Restaurant			40%	split	29.1	30.6	89	267	533	
			Gas Station w/Market			60%	split	43.6	5.0	22	65	131	
	A17	Z46	Commercial		114.8	Acres	65%	74.6		N/A	N/A	N/A	
			Restaurant			40%	split	29.1	30.6	89	267	533	
			Gas Station w/Market			60%	split	43.6	5.0	22	65	131	

Table 4.5
Trip Generation
Moderate Growth Scenario (most likely to occur)

Township	Area Des.	Zone	Land Use	Zoning Density	Size	Unit	% Developable	Total Area Developable	Ratio	Pertinent Units			Comments
									PU**/acre	5 Years 10%	10 Years 30%	20 Years 60%	
	A18	Z47	Residential w/ Services	R2	826.4	Acres	70%	578.5	1.8	101	304	607	
Union	A37	Z41	Residential	R1	516.5	Acres	70%	361.6	0.3	12	36	72	
		Z50	Residential	R1	740.4	Acres	70%	518.3	0.3	17	52	104	
	A42	Z41	Residential	R1	264.0	Acres	70%	184.8	0.3	6	18	37	
	A38	Z49	Airport/commercial		981.4	Acres	10%	98.1		189	567	1133	
			Restaurant			30%	split	29.4	30.6	90	270	540	
			Gas Station w/Market			30%	split	29.4	5.0	15	44	88	
			Shopping Center			40%	split	39.3	21.5	84	253	505	
Jackson	A1	Z18	Residential	R1	344.4	Acres	75%	258.3	0.3	9	26	52	
	A4	Z17	Residential	R1	665.7	Acres	75%	499.3	0.3	17	50	100	
	A3	Z17	Commercial		97.0	Acres	65%	63.1		N/A	N/A	N/A	
			Restaurant			40%	split	25.2	30.6	77	231	462	
			Gas Station w/Market			60%	split	37.8	5.0	19	57	113	
	A3	Z17	Industrial		872.9	Acres	65%	567.4	16.9	959	2877	5753	
	A2	Z17	Residential w/ Services	R2	487.8	Acres	75%	365.9	1.8	64	192	384	
	A1A	Z61	Residential w/ Services	R2	275.5	Acres	70%	192.9	1.8	34	101	202	
Jefferson	N/A												
Sugar Creek	N/A												
Washington	A9	Z59	Theme Park		774.8	Acres	30%	232.4	8.2	190	569	1138	Employees
	A9	Z28	Commercial		1291.3	Acres	20%	258.3		N/A	N/A	N/A	
			Restaurant			30%	split	77.5	30.6	237	710	1421	
			Resort Hotel			70%	split	180.8	23.2	419	1257	2513	
	A10	Z31	Residential w/ Services	R2	516.5	Acres	70%	361.6	1.8	63	190	380	
		Z32	Residential w/ Services	R2	137.7	Acres	70%	96.4	1.8	17	51	101	
		Z60	Residential w/ Services	R2	23.0	Acres	70%	16.1	1.8	3	8	17	
Center	A12	Z13	Residential	R1	413.2	Acres	70%	289.2	0.3	10	29	58	1/2 Mod, 1/2 High
		Z14	Residential	R1	525.2	Acres	70%	367.6	0.3	12	37	73	

Table 4.5
Trip Generation
Moderate Growth Scenario (most likely to occur)

Township	Area Des.	Zone	Land Use	Zoning Density	Size	Unit	% Developable	Total Area Developable	Ratio PU**/acre	Pertinent Units 5 Years 10%	Pertinent Units 10 Years 30%	Pertinent Units 20 Years 60%	Comments
		Z53	Residential	R1	459.2	Acres	70%	321.4	0.3	11	32	64	
	A16	Z35	Residential	R1	401.8	Acres	70%	281.3	0.3	9	28	56	
		Z36	Residential	R1	321.3	Acres	70%	224.9	0.3	7	22	45	
	A13	Z13	Commercial		381.7	Acres	70%	267.2		N/A	N/A	N/A	1/2 Mod
			Restaurant			30%	split	80.2	30.6	245	735	1470	1/2 Comm, 1/2 Ind
			Gas Station w/Market			30%	split	80.2	5.0	40	120	240	
			Shopping Center			40%	split	106.9	21.5	229	688	1376	
		Z14	Commercial		288.4	Acres	70%	201.9		N/A	N/A	N/A	1/2 Mod
			Restaurant			30%	split	80.2	30.6	245	735	1470	1/2 Comm, 1/2 Ind
			Gas Station w/Market			30%	split	80.2	5.0	40	120	240	
			Shopping Center			40%	split	106.9	21.5	229	688	1376	
	A13	Z13	Industrial		381.7	Acres	65%	248.1	16.9	419	1258	2516	1/2 Comm, 1/2 Ind
		Z14	Industrial		288.4	Acres	65%	187.5	16.9	317	950	1901	
	A11	Z60	Residential w/ Services	R2	642.8	Acres	70%	450.0	1.8	79	236	472	
	A11A	Z31	Residential w/ Services	R2	918.3	Acres	70%	642.8	1.8	112	337	675	1/2 for Mod
	A11B	Z32	Residential w/ Services	R2	723.2	Acres	70%	506.2	1.8	89	266	532	1/2 for Mod
		Z35	Residential w/ Services	R2	516.5	Acres	70%	361.6	1.8	63	190	380	

*Pertinent Units would be Dwelling Units, Retail, or Non-Retail Employees
**PU = Pertinent Unit

Table 4.6
Trip Generation
High Growth Scenario (may occur)

Township	Area Des.	Zone	Land Use	Zoning Density	Size	Unit	% Developable	Total Area Developable	Ratio	Pertinent Units			Comments
									PU**/acre	5 Years 5%	10 Years 10%	20 Years 20%	
Eagle	N/A												
Perry	N/A												
Union	A39	Z40	Residential	R1	441.9	Acres	70%	309.3	0.3	5	10	21	
		Z50	Residential	R1	413.2	Acres	70%	289.2	0.3	5	10	19	
	A40	Z39	Residential	R1	573.9	Acres	70%	401.7	0.3	7	13	27	
		Z41	Residential	R1	595.5	Acres	70%	416.9	0.3	7	14	28	
	A41	Z41	Residential	R1	45.9	Acres	70%	32.1	0.3	1	1	2	
Jackson	N/A												
Jefferson	A5	Z54	Residential	R1	160.7	Acres	70%	112.5	0.3	2	4	7	
Sugar Creek	A6	Z56	Residential w/ Services	R2	189.4	Acres	70%	132.6	1.8	12	23	46	
	A7	Z29	Residential w/ Services	R2	269.7	Acres	70%	188.8	1.8	17	33	66	
Washington	A9	Z59	Theme Park		774.8	Acres	80%	619.8	8.2	253	506	1012	
	A9	Z28	Commercial		1291.3	Acres	75%	968.5		N/A	N/A	N/A	
			Restaurant			30%	split	290.5	30.6	444	888	1776	
			Resort Hotel			70%	split	677.9	23.2	785	1571	3142	
	A8	Z28	Commercial		80.3	Acres	70%	56.2		N/A	N/A	N/A	
			Restaurant			30%	split	16.9	30.6	26	52	103	
			Resort Hotel			50%	split	28.1	23.2	33	65	130	
			Gas Station w/Market			20%	split	11.2	5.0	3	6	11	
Center	A12	Z13	Residential	R1	413.2	Acres	70%	289.2	0.3	5	10	19	1/2 Mod, 1/2 High
		Z14	Residential	R1	525.2	Acres	70%	367.6	0.3	6	12	24	
		Z53	Residential	R1	459.2	Acres	70%	321.4	0.3	5	11	21	
	A13	Z13	Commercial		381.7	Acres	70%	267.2		N/A	N/A	N/A	1/2 High
			Restaurant			30%	split	80.2	30.6	122	245	490	1/2 Comm, 1/2 Ind
			Gas Station w/Market			30%	split	80.2	5.0	20	40	80	
			Shopping Center			40%	split	106.9	21.5	115	229	459	
		Z14	Commercial		288.4	Acres	70%	201.9		N/A	N/A	N/A	1/2 High
			Restaurant			30%	split	80.2	30.6	122	245	490	1/2 Comm, 1/2 Ind
			Gas Station w/Market			30%	split	80.2	5.0	20	40	80	
			Shopping Center			40%	split	106.9	21.5	115	229	459	
	A13	Z13	Industrial		381.7	Acres	65%	248.1	16.9	210	419	839	1/2 Comm, 1/2 Ind
		Z14	Industrial		288.4	Acres	65%	187.5	16.9	158	317	634	

BOONE COUNTY THOROUGHFARE PLAN
2008 HIGH GROWTH SCENARIO

NOT TO SCALE

PREDICTED AVERAGE ANNUAL DAILY TRAFFIC

- <100
- 100-500
- 501-1000
- 1001-2000
- 2001-3000
- 3001-4000
- >4000

FIGURE 4.3

BOONE COUNTY THOROUGHFARE PLAN
2018 HIGH GROWTH SCENARIO

NOT TO SCALE

SUGAR CREEK | WASHINGTON | CLINTON | MARION | JEFFERSON | UNION | WORTH | HAMILTON COUNTY | JACKSON | HARRISON | PERRY | EAGLE | HENDRICKS COUNTY

>14,000 >8,000 >8,000 >10,000 >8,000 >6,000 >19,000 >5,000 >5,000 >6,000 >8,000 >10,000 >5,000 >7,000 >14,000 >4,000 >4,000 >18,000 >4,000 >8,000 >6,000 >14,000 >10,000 >87,000 >4,000 >15,000 >17,000 >4,000 >4,000 >13,000 >11,000 >4,000 >12,000 >10,000

THORNTON, LEBANON, DOVER, ADVANCE, JAMESTOWN, MILLEDGEVILLE, NEW BRUNSWICK, ELIZAVILLE, GADSEN, ROSSTON, BIG SPRINGS, NORTHFIELD, WHITESTOWN, ROYALTON, ZIONSVILLE

HENRY RD., KAREN ROAD, BLUBAUGH RD., MECHANICSBURG RD., HORTON RD., TERHUNE, 241ST STREET, FALL RD., RAY, CEMETERY RD., EVANS RD., PIKE, VICTOR RD., ELM SWAMP RD., THOMPSON VINE ROAD, 226TH STREET, HAZELRIGG ROAD, SNAKE PLAINS RD., TERHUNE RD., 216TH STREET, DEAD END RD., SNAKE PLAINS RD., WAUGH, 206TH STREET, BASE LINE ROAD, 196TH STREET, 186TH STREET, TYRE ROAD, KEY RD., HOLMES RD., NORTHFIELD DR., 146TH STREET, MAX, 136TH STREET, MIDDLE JAMESTOWN RD., BUDD RD., 131ST STREET, 126TH STREET, 121ST STREET, 116TH STREET, 106TH STREET, 96TH STREET, GRASSY, FAYETTE, HUNT CLUB RD., CLUB RD.

PROPOSED NORTH–SOUTH CORRIDOR TO I–74

PREDICTED AVERAGE ANNUAL DAILY TRAFFIC

<100	1001-2000	>4000
100-500	2001-3000	
501-1000	3001-4000	

FIGURE 4.4

CHAPTER V: Results

5.1 Identification of Problem Areas

The result of the modeling process is the identification of high capacity, problem areas of the transportation system within the county. The identification of these areas then lead to recommended improvements that can be made within the Boone County roadway network. The specific problem areas are identified here.

5.1.1 Lebanon Area

The City of Lebanon maintains several major through routes within the city limits. SR 32, a *minor arterial* as classified by INDOT, travels east to west across Boone County. SR 32 also passes through the heart of the City of Lebanon. Within the city limits, SR 32 makes several major turns resulting in an indirect route and considerable traffic congestion. SR 39, a major collector through Boone County, travels north to south, again bisecting the City of Lebanon. Through traffic on both SR 32 and SR 39 are primary sources of traffic congestion for the City and also the county. The traffic modeling effort projects a steady increase in volumes on both of these roadways within the next 20 years. Traffic forecasting also suggests that as congestion increases within the city limits of Lebanon, vehicular traffic will seek alternate routes to avoid the city. This phenomenon, in turn, will produce increased demand on county roadways.

5.1.2 North-South Corridor

Hendricks County is planning a north-south corridor that will connect I-70 to I-74 and eventually I-74 to I-65. At this time, the first phase of this corridor, the segment from I-70 to I-74, is in the planning stages. Hendricks county is working closely with Boone County to determine the best location for the segment from I-74 to I-65. This corridor will greatly increase traffic at the intersection which connects the corridor to I-65.

5.1.3 Zionsville Area

Zionsville is a heavily congested area and new building continues daily. There exists a large percentage of traffic traveling east-west that does not have Zionsville as its primary destination. These are merely through vehicles traveling from Hamilton County to I-65 or elsewhere in Boone County. The City of Zionsville does not have the capabilities, given the existing development constraints, to alleviate this traffic condition within its downtown area. To maintain the village like atmosphere that exists in Zionsville, road widening through Zionsville is not an option. Demand suggests that an alternate route around Zionsville will be necessary in the near future. As congestion within the city limits increases, vehicles will

divert from the straightest path through Zionsville and onto county roads that are already having difficulty in meeting vehicular demands.

Another heavy demand on Zionsville exists north to south through the town. Again, many of these north-south vehicles do not have Zionsville as its primary destination. Many of these vehicles are traveling to and from Indianapolis to homes in various parts of Boone County. Demand suggests that a north-south connection beyond or near the Zionsville City limits would alleviate much of the congestion in downtown Zionsville.

5.1.4 Indianapolis Road/CR 650 S.

Major development is anticipated to occur in the vicinity of Indianapolis Road and CR 650 S. This development will involve a mix of land uses including residential, commercial, and industrial. The existing roadways are not anticipated to have the ability to accommodate this large influx of vehicular traffic.

5.1.5 General

No other major areas are currently anticipated to show significant problems for the county in the next 20 years. There is a small non-operational theme park located to the east of the Thorntown that could potentially grow rapidly. In the event that the theme park is opened, a traffic study specifically tailored to the size of the park is recommended. At this time, the future of this park is unknown and proposed roadway improvements would be imprecise and likely incorrect.

CHAPTER VI: Recommendations

6.1 Proposed Roadway Segments

Based on the problem areas identified in Chapter V: Results, the development of improvement alternatives was considered. The resulting proposed roadway segments are needed to address the problem areas.

6.1.1 Alternate SR 32

To alleviate the congestion problems within Lebanon, and also to avoid potential problems throughout Boone County, it is recommended that a SR 32 "Alternate Loop" be created around Lebanon. This alternate loop would provide a connection from SR 32 west of Lebanon, to SR 39 south of Lebanon, then to SR 32 east of Lebanon, and finally to SR 39 north of Lebanon. It is recommended that this loop attempt to travel the following pathway with the realization that no preliminary engineering or analysis has been conducted to determine the precise roadway location. A connection should be made from SR 39 to SR 32 along the southwest edge of Lebanon, outside the city limits. It is suggested that this connection initially begin at SR 32 west of the city limits, travel south along or near CR 200 W, cross Mt. Zion Road and the Conrail Railroad, and tie into SR 39 near or at Middle Jamestown Road. Figure 6.1, "Proposed Functional Classification", illustrates the proposed location. It must be noted that this is preliminary and may not reflect the actual final location of the proposed alternate loop.

To continue this alternate loop, it is recommended that a connection between SR 39 and I-65 be created. This second section of the proposed alternate loop would connect to section one at SR 39 and travel east to tie into or near the existing interchange at I-65. This interchange would require significant modification to accommodate the proposed roadway. The complete connection to SR 32 on the east side of Lebanon would be made with a third section from I-65 to SR 32, along existing county roads 100S and 300E. These three sections provide an alternate route for through vehicles on SR 32 and also a connection for SR 39 on the south side of Lebanon to SR 32. These sections would be classified as a minor arterial and would originally be designed as a three-lane section with Right-of-Way (ROW) acquired to expand the roadway into a five-lane section as traffic demands increase.

To accommodate through traffic on SR 39 and a smooth connection between SR 32 and SR 39 north of Lebanon, it is recommended that the alternate loop be continued northward on the east side of Lebanon. The fourth section of this proposed corridor would begin at SR 32 at the termination of section three. The roadway would then continue northward at approximately CR 300 E. towards the intersection of CR 450 N., north of Elizaville Road. The route would then generally follow along existing CR 450 E, with the possible exception

of the segment between Elm Swamp Road and CR 25E, where slight realignment northward (relocation/straightening) will likely be necessary. The existing 450 N roadway would be improved and upgraded to a *major collector* to SR 39. This entire segment of the proposed roadway from SR 32 to SR 39 north of Lebanon, would be classified as a *major collector*. Again, it is recommended that the roadway be designed as a three-lane section with the possibility of a five-lane section in the future.

This alternate loop would provide efficient access and routing for vehicles throughout the county. Traffic congestion would be alleviated in downtown Lebanon and on surrounding county roadways as demand increases. Many vehicles would be serviced by the proposed roadway.

The possibility of a connection from SR 39, north of Lebanon, to US 52 and then to SR 32 west of Lebanon was briefly examined. Based on existing information and traffic forecasting models, it was determined that a new connection of this type would not be required by the county within the next 20 years. Currently, there is sufficient access for vehicles between I-65, US 52, and SR 32. According to projections, there will not be a great demand for another connection between SR 39 and US 52 than that of CR 450 N. Figure 6.1, "Proposed Functional Classification", shows this proposed roadway.

6.1.2 Zionsville Alternative Routes

An existing and obvious east-west roadway "bypass" for Zionsville from I-65 to Hamilton County is through Whitestown. This connection is logical given the north-south corridor of SR 267 into Hendricks County is nearby and that the east-west corridor of 146th Street in Hamilton County lines up with CR 300 S. This pathway would require the least amount of new road construction through Boone County. Traffic modeling shows that vehicular traffic will utilize CR 300 S., as an alternate route around Zionsville, even without roadway improvement. CR 300 S. is a narrow roadway with no realistic options for widening through Whitestown. It is therefore recommended that a route outside of the Whitestown town limits would be preferable. It is recommended that CR 400 S. be extended from CR 450 E. to CR 575 E. Existing sections of CR 400 S. would require improvement from CR 400 E. to CR 450 E. It is then recommended that a roadway be constructed to connect CR 400 S. to CR 300 S. while bypassing Whitestown. This improved route would still serve Whitestown, while avoiding any future problems with widening issues. It is also important to note that the recommended new/improved connection between I-65 at CR 450E and the east county line (146th Street in Hamilton County) will also serve as a major cross-county connection to the proposed North-South Corridor from Hendricks County to I-65 in Boone County along an improved SR 267 (as recommended here). Figure 6.1, "Proposed Functional Classification", shows this proposed roadway.

To alleviate the congestion related to the north-south vehicles, it is recommended that a north-south alternative route be constructed from 96th Street to SR 32. Most of this connection already exists as Cooper Road, CR 875 E, and CR 900E. It is recommended that Cooper Road be upgraded to a *minor arterial*. It is then recommended that a section of roadway be constructed from the intersection of SR 334 and Cooper Road to near the end of CR 875 E. It must be noted that no engineering research has been conducted to determine a realistic preliminary alignment for this proposed roadway. The precise location of the connection of CR 875 E. is yet undetermined. It is recommended that CR 875 E. be upgraded to a *major collector*. Finally, it is recommended that the north-south connection to SR 32 be completed. CR 875 E. and CR 900 E. function as the existing corridor connection. However, north of CR 250 S. the roadway makes two severe 90° turns that are narrow and dangerous. It is recommended that these curves be straightened and the roadway be improved to a minor collector. Figure 6.1, "Proposed Functional Classification", shows this proposed roadway.

For this north-south corridor to provide the best possible use for citizens, it is recommended that a new roadway section be constructed on 96th Street for continuity between Cooper Road and Ford Road. There currently exists no direct connection between these two roadways. This proposed roadway section is essential to the proper operation of the north-south corridor previously discussed. Figure 6.1, "Proposed Functional Classification", shows this proposed roadway.

An additional linkage (connection) would also greatly enhance the Cooper Road/CR 875E as a north-south corridor and an alternative route around Zionsville, by connecting Copper Road and 96th Street with I-465. This is likely, from limitations due to accepted (INDOT)geometric standards, the only possible new interchange location available along I-465 between its intersection with I-65 on the west end, to its intersection with I-465 South on the east end, that also aligns with a logical connector roadway (Cooper Road).Other interchange locations (i.e. Ford Road) are too close to existing interchanges to allow them to be permitted. It should be recognized that INDOT will likely resist efforts to add new interstate interchanges as a matter of policy. Each interchange on an interstate system adds construction/maintenance costs and presents the opportunity for increased accidents. These are valid concerns that must be overcome in order to proceed with any new interchange. It is recommended that the County and the Town of Zionsville develop a unified policy position regarding the interchange and initiate discussions with INDOT. Since the development of new interchanges necessarily is a complex process that requires eight to ten years minimum, the initiation of communications with INDOT as soon as possible is recommended.

6.2 Roadway Improvements

Traffic analysis and volume projections show that several existing roadways throughout the county will require upgrades or widening within the next 20 years to accommodate a growing number of vehicles. Several of these roadways have been discussed in the previous section but are again summarized below. The following roadways should be scheduled for improvements:

6.2.1 SR 32

SR 32 is an east-west corridor that crosses the entire county approximately midway. Currently SR 32 is classified by INDOT as a *minor arterial. Minor arterials* carry through traffic from one major area to another. SR 32 is a two-lane roadway with many passing areas as the roadway travels through the county. Within the Lebanon city limits, several 90° turns are required by the vehicle to travel continuously along SR 32. On the east side of Lebanon, between Lebanon and the county line, traffic projections have shown that within 20 years the roadway will need to be upgraded to a *"Super-2"* highway. This type of roadway is a two-lane road, one lane in each direction, with passing blisters and turning lanes added as needed or required. This type of roadway would have wider, paved shoulders unlike the roadway that currently exists. Traffic projections do not show that SR 32 will require an upgrade to a five-lane section within the next 20 years. Caution must be used with this statement in that the traffic projections may not account for certain changes that may occur in the area. These traffic projections do not reflect a large increase in traffic on SR 32 due to projects such as road widening or town bypassing that may take place in Hamilton County. If these events occur, or if volumes substantially increase for other unforseen reasons, the possibility of widening SR 32 must be reevaluated. It should be noted that since this is a state owned facility, the recommended improvements would be INDOT's responsibility. It is anticipated that SR 32 on the west side of Lebanon will not require any significant improvements within the next 20 years.

6.2.2 CR 450 N.

CR 450 N. between SR 39 and CR 300 E. should be improved to accommodate added vehicles created by the SR 32 alternate loop as discussed in Section 6.1, "Proposed Roadway Segments". It is recommended that CR 450 N. be upgraded to a *major collector.* Preliminary analysis shows that this section should be a three-lane roadway initially, with sufficient right-of-way to accommodate a five-lane section in the future.

6.2.3 SR 334

SR 334 between I-65 and Zionsville will require a five-lane section within the next 20 years. Traffic volumes predict that two travel lanes in each direction with center turn lanes where appropriate will be required to accommodate the rapid growth of the area. This five-lane

section should be tapered to match the existing two-lane section east of the proposed north-south corridor as Cooper Road. Continuing the five-lane section into Zionsville would be futile since the roadway will remain two lanes within Zionsville. As with the SR 32 improvements noted previously, it should be noted that since this is a state owned facility, the recommended improvements would be INDOT's responsibility.

6.2.4 CR 650 S.

Based on the area growth scenarios utilized for this thoroughfare plan, it is recommended that CR 650 S. be upgraded to a three-lane section from SR 267 to Indianapolis Road. A three-lane section maintains one travel lane in each direction with a center turn lane where appropriate. While zoning has not changed the land use in the area at this time, it is predicted that growth and rezoning will occur in the near future. Several factors in the area will contribute to this growth. The north-south corridor along SR 267 from I-65 to I-70 will greatly influence traffic patterns. This could cause a strong influx of traffic along CR 650 S. Several developments in the area are also currently being proposed. These developments would significantly contribute to an increase in traffic on CR 650 S. It is therefore recommended that *Right-of-Way* be procured or donated by developers and reserved for a possible five-lane section in the future.

6.2.5 Indianapolis Road

Traffic projections show that Indianapolis Road will require major improvements within the next 20 years. As with CR 650 S., it is anticipated that a significant amount of development will occur in the immediate vicinity of Indianapolis Road. It is therefore recommended that Indianapolis Road be widened to a five-lane section to serve as a useful and viable frontage road to I-65 and for development.

6.2.6 North-South Corridor

It is recommended that this segment of the corridor extend into Boone County along existing SR 267. This would require some upgrade and modification to this existing roadway. It is then recommended that the corridor connect to I-65 at the existing intersection of I-65 and SR 267. Again, it should be noted that since this is a state owned facility, the recommended improvements would be INDOT's responsibility.

6.2.7 700 S./Middle Jamestown Road

It is recommended that the classification of 700 S., east of SR 75, and Middle Jamestown Road, from 700 S. to 500 W., be upgraded to a major collector. At this time, no actual roadway improvements are anticipated. It is simply recommended that the roadway classification be upgraded so that ROW can be obtained in the event of major development.

6.2.8 CR 200 E.

Similar to the upgrade of CR 700 S., it is recommended that the classification of CR 200 E., from CR 600 S. to 550 S., be upgraded to a major collector. No improvements are recommended at this time, only an upgrade to the roadway classification.

6.3 Alternative Methods of Transportation

Alternative methods of transportation should always be considered as a viable relief from congestion. Alternative methods of transportation could include such items as bicycle trails, hiking paths, or mass transportation such as buses. Under existing conditions, Boone County maintains a rural atmosphere and the majority of the community does not express interest in alternative transportation. However, the southeast area of the county, particularly around Zionsville, shows strong support for these alternative methods. Bike trails lead patrons throughout Indianapolis. It is anticipated that these trails will be extended to the border of Boone County. At that time, Boone County should consider a specific trail route for the southeast quadrant of the county. Additionally, a trail route may be considered from the City of Zionsville to the City of Lebanon.

Other alternative methods of transportation, such as mass transit by both rail and busses, were considered briefly. The intensive capital construction cost for rail routes precludes Boone County from pursuing such options on its own accord. Similarly, bus transportation capital costs and operational costs prove to be substantial barriers to consideration by Boone County. It is recommended, however, that Boone County continue to remain involved in activities within the region regarding rail and bus transportation. Such regional systems currently being discussed, such as the Indianapolis - Chicago light rail alternative, may present opportunities in the future for Boone County to participate in a financially feasible situation.

6.4 Right of Way Standard Widths and Building Set-Backs

Right-of-way standard widths and building set-back standard widths are integral components in the proper development of counties and municipalities. The importance of both right-of-way (ROW) reservation and front building set-backs cannot be under-estimated as a county continues to experience population growth and expansion.

Right-of-way widths of proper dimension are necessary to allow for the expansion of roadway facilities as required by future growth and increases to traffic volumes. Many governmental agencies have experienced the difficulties, as well as the significant costs, associated with the expansion of roadway facilities after development has occurred. This experience is not only costly to the public agency and then the public, it is detrimental to the development which has occurred. Having the proper standards implemented prior to development results in a significantly reduced cost to the public and development.

In conjunction with the standard widths of right-of-way which are to be implemented, front building set-back widths are also necessary. *Set-backs* achieve a specified width which separates any building facility from the roadway corridor. These set-backs also allow for the aesthetic development of roadway corridors and allot a specified area for green space and landscaping, resulting in building frontages which conform to a desired panorama.

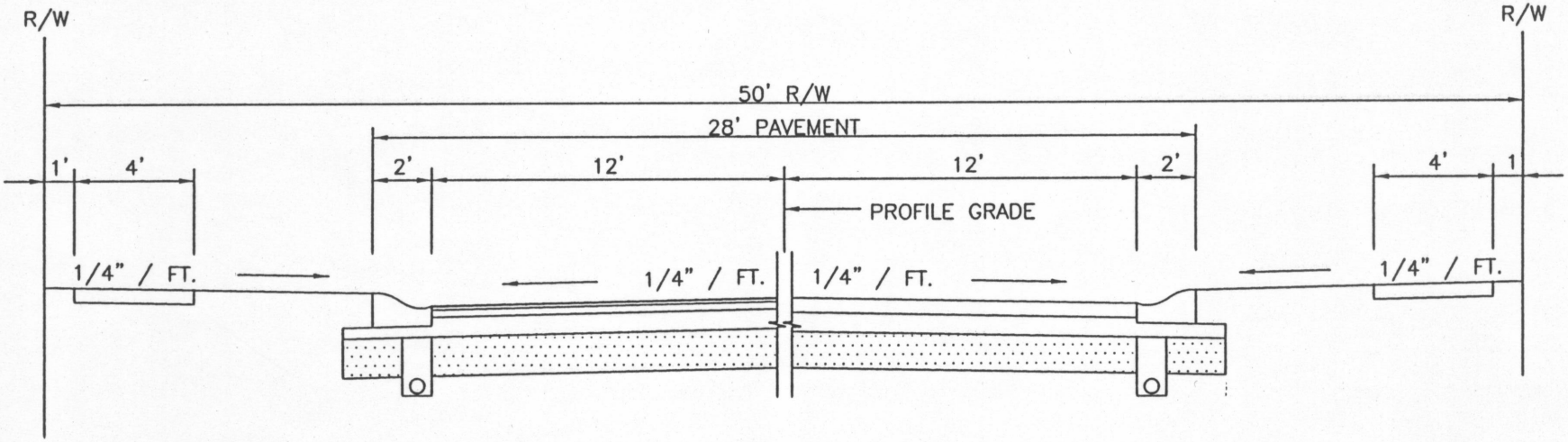
Right-of-way standard widths and building set-back standard widths vary in direct proportion to the level of functional classification of each individual roadway. The standard widths which are required as development occurs are given on Tables 6.1 and 6.2, "ROW and Building Set-back Standard Widths". The right-of-way widths are also graphically displayed in Figures 6.2 through 6.6 showing the required ROW range in conjunction with various roadway sections.

Table 6.1
Right-of-Way Standard Widths

Functional Classification of Roadway	**Right-of-Way Width** (feet)
Major Arterial Roadway	130 - 150
Minor Arterial Roadway	110 - 130
Major Collector Roadway	90 - 100
Minor Collector Roadway	60 - 90
Local Roadway	50 - 80
Subdivision Street	50

Table 6.2
Building Set-Back Standard Widths

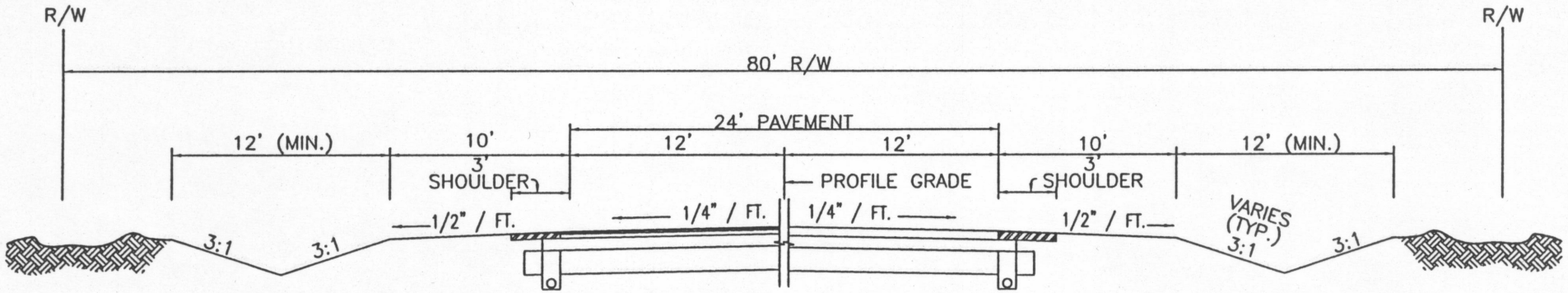
Functional Classification of Roadway	**Set-Back Width** (feet)
Major Arterial Roadway	55
Minor Arterial Roadway	50
Major Collector Roadway	45
Minor Collector Roadway	40
Local Roadway	30
Subdivision Street	25



TYPICAL RESIDENTIAL STREET
CROSS SECTION WITH CURB & GUTTER

FIGURE VI–2

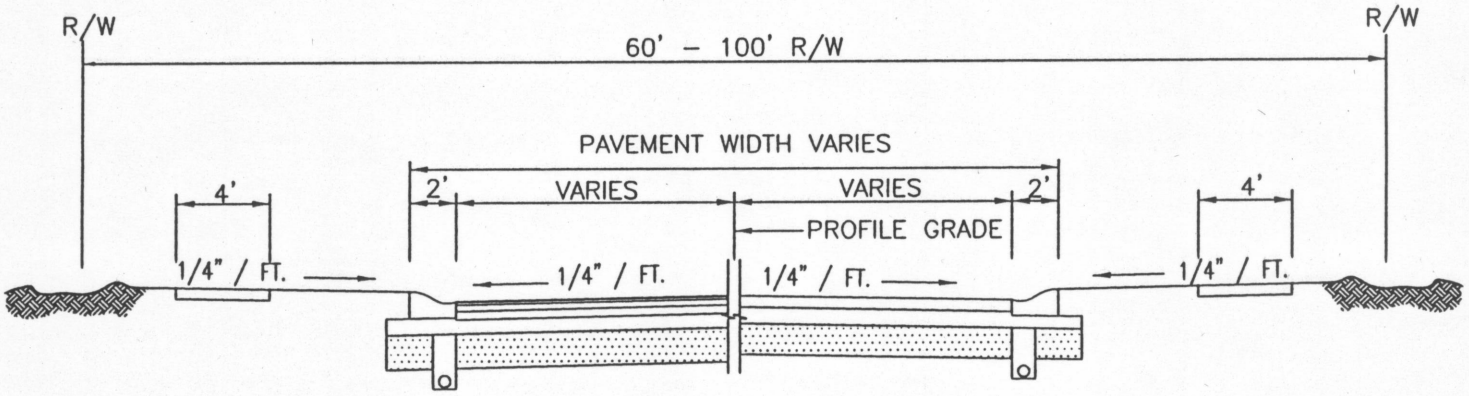
SCALE: NO SCALE



TYPICAL LOCAL ROADWAY
CROSS SECTION WITH SHOULDER

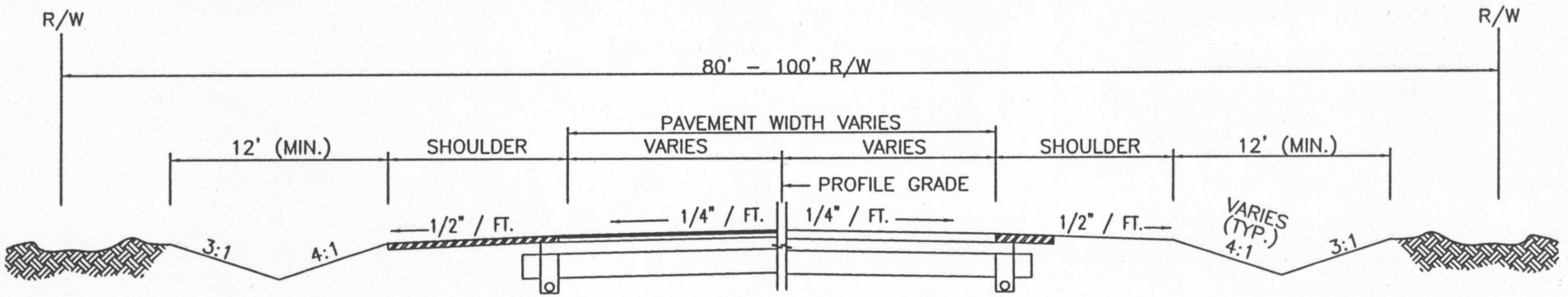
FIGURE VI–3

SCALE: NO SCALE



TYPICAL COLLECTOR ROADWAY
CROSS SECTION WITH CURB & GUTTER

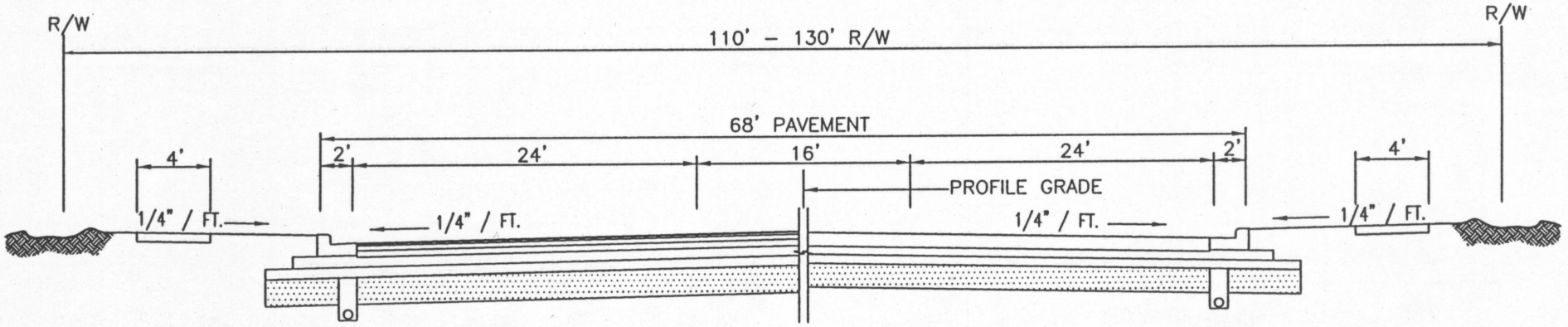
FIGURE VI–4



TYPICAL COLLECTOR ROADWAY
CROSS SECTION WITH SHOULDER

FIGURE VI–5

SCALE: NO SCALE



TYPICAL MINOR ARTERIAL ROADWAY
CROSS SECTION WITH CURB & GUTTER

FIGURE VI–6

SCALE: NO SCALE

6.5 Cost Estimate

The improvement of roadway systems is a long-term fiscal challenge which is continual and costly. All governmental agencies face the difficulty of implementing the necessary improvements which are required to meet public expectations, traffic demands and statutory responsibilities. The short tern and long range planning processes set in place by these agencies facilitate such implementation. Cost estimates and fiscal restraints are two factors which weigh heavily into the above mentioned planning process, in conjunction with the priority process and procedures which are developed by the agency.

Cost estimates delineate the projected cost for the type of improvement which is either currently needed or projected to be required. As the type of improvement varies widely, so do the costs for such upgrades. The projected costs for the proposed roadway improvements, as previously mentioned, given in millions of 1999 dollars, are tabulated as follows:

Table 6.3
County Roadway Improvement Cost Estimates

Roadway	Limits	Upgrade Type	Traffic Volume*	Length (miles)	Cost (1999) (millions)
CR 450 North / CR 300 East / CR 200 South	SR 39 to I-65	2 Lane	5000 to 8000	11.0	$7.9 M
CR 650 South	SR 267 to I-65	3 Lane	4000	2.2	$2.8 M
Indianapolis Road	County Line to Lebanon	5 Lane	6000 to 17,000	9.4	$16.3 M
96th Street	Ford Road to Cooper Road	3 Lane	5000	1.6	$2.0 M
CR 300 South/CR 400 South	SR 267 to E. County Line	3 Lane	6500 to 10,000	8.7	$11.0 M
Cooper Road / CR 875 East	96th Street to CR 300 S.	3 Lane	6000 to 8000	5.4	$3.1 M
CR 875 East / CR 900 East	CR 300 S. to SR 32	2 Lane	5000	5.3	$3.0 M
CR 200 West/ CR 100 South	SR 32 to I-65	3 Lane	8000 to 9000	4.4	$5.4 M

*Projected 2018 ADT Volume in vehicles per day.

Table 6.4
State Roadway Improvement Cost Estimates

Roadway	Upgrade Type	Length (miles)	Cost (1999) (millions)
SR 32	"Super 2"	11.2	$5.2 M
SR 334	5 Lane	3.4	$5.9 M
Cooper Road Interchange	Interchange	---	$20.0 M
SR 267	3 Lane	4.0	$2.9 M

The total cost for the above listing of improvements would be eighty-six million dollars ($86,000,000.00), if performed today. The cost, if performed in the year 2020 A.D., would be projected as almost two hundred forty million dollars ($240,000,000.00), allowing for a five percent annual increase for inflation and increased construction costs. However, of the above improvements, thirty-four million would not be under local jurisdiction, therefore the actual estimated cost to Boone County, in today's dollars, would be fifty-two million dollars ($52,000,000.00) or one hundred forty-five million dollars ($145,000,000.00), in 2020 A.D.. This amount may seem overwhelming for a local governmental agency, however, a review of the basis for these numbers in conjunction with a realistic planning process, realizes an annual fiscal outlay which is significantly less than the total. Ultimately, what this means is that proper, programmed implementation of the improvement plan must be enacted to achieve progress in this regard, as well as a realistic, fiscally constrained annual outlay.

CHAPTER VII: Funding Alternatives

7.0 Funding

The cost of simply maintaining existing roads and bridges is quite substantial, as shown in Chapter 3, "Roadway Management System". When the capital cost for upgrading, widening and improving existing routes, and constructing needed new routes is considered in addition to the maintenance costs, the financial burden could be deemed insurmountable. Given that both maintenance and transportation improvement projects are essential for the continued economic vitality and the good quality of life of Boone County citizens, it becomes necessary to identify potential sources of funding. Several funding alternatives exist that may be considered individually or, in a more realistic scenario, in some combination. These include:

- Tax Incremental Financing (TIF)
- State and Federal Transportation Funds
- User Fees (i.e. wheel taxes)
- Impact Fees
- Local Taxes
- Negotiated Development Fees (Exactions)

These funding options each have associated advantages and disadvantages. The general characteristics of each funding type are described below. It should be noted that further detailed analysis of each funding type, which is beyond the scope of this report, may be necessary in order to fully evaluate the effectiveness for Boone County.

7.1 Tax Incremental Financing

Tax Incremental Financing or TIF, as it is commonly referred to, is a financial mechanism that temporarily reallocates excess tax revenue from the increased amount of taxes generated by new developments. The revenues are used to pay for bonds issued by the local government, in this case Boone County, to construct needed infrastructure improvements to attract new or retain / improve existing developments and employment centers. TIF financing applies to property taxes only, and does not include personal property taxes levied on equipment, etcetera.

In the case of TIF financing, the additional tax revenue generated by development within the specific development district remains within the TIF district to pay debt service on outstanding bonds. It is important to understand that other tax supported programs that normally benefit directly from property tax revenues, such as the general county government, schools, libraries, etcetera, will continue to receive their share of pre-TIF tax revenues for the district, but will not directly benefit from the increased tax revenues until the bonded indebtedness is retired. This is often perceived as

negative impact by the schools and libraries. Since TIF's are usually implemented in order to initiate development that would not otherwise occur, the "new" increased revenues generated by the development are not, in reality, "lost" to these other entities, merely delayed (i.e. without the TIF, there would be no increase in tax revenues for that district).

7.2 State and Federal Transportation Funds

Numerous state and federal transportation funding programs and grants exist that can be utilized to assist the County in constructing new roadway improvements. Most of the programs have local government matching requirements. Boone County has and will likely continue to use these sources to the greatest extent possible. The most frequently used program involves the bridge replacement program funded by the Indiana Department of Transportation.

Several projects identified within the "needs" portion of this report are on the state maintained system, such as:

- The SR 32 "super-two" improvement
- New interchange on Interstate 465 at Cooper Road
- Interchange improvements along Interstate 65

Other identified projects from the "needs" list are excellent candidates for the state system classification and / or assistance. These include:

- The alternate SR 32 truck loop from the east side of Lebanon, extending south across I-65 and SR 39 to the west side of Lebanon to reconnect with SR 32.
- The east-west connection from SR 267, where the new Hendricks County sponsored "North-South Corridor Road" is recommended to connect, to US 421 and 146th Street in Hamilton County.

While INDOT funding needs to be utilized as extensively as possible, it is not without obstacles. Projects that are identified as needed by Boone County in its Transportation Improvement Plan (TIP) will be considered by INDOT for funding. Boone County must then request INDOT to place the local project into INDOT's construction program, or statewide TIP. Inn order to be accepted by INDOT into its program (i.e. funded), the project must compete with all other local projects statewide for limited funding availability. This process can take several years to accomplish. Once the project is successfully programmed through INDOT, it is subject to INDOT's requirements. These requirements include meeting INDOT design standards, public involvement process, and environmental review process. These requirements can not only be costly, but normally add significant time delays to the overall development of the project.

7.3 User Fees

User Fees can be utilized to provide increased revenues. In the case of transportation needs, two major sources of "user fees" are available:

- Toll Road Fees
- Wheel Tax Fees

Toll Road Fees are normally reserved for major cross country routes that offer major time savings to travelers in order to justify the fees. In the case of local roadways, such as are needed in Boone County, the viability of such fees is extremely poor, given that the local roadways would likely be used to bypass the Toll segments in order to avoid the fees.

The other major user fee identified is a wheel tax. This tax can be assessed equally on all vehicles registered in Boone County or on a vehicle weight / vehicle type distribution. The intent is to capture some of the costs for maintaining the transportation network from the users. The downside of this is that many of the "users" of the county roads are not Boone County residents, and therefore would not pay the wheel tax.

7.4 Impact Fees

Impact fees have been considered by several counties and communities in the greater Indianapolis metropolitan area with in the last several years. Several communities have successfully implemented such fees for transportation improvements, as well as other publicly financed services and programs, such as parks systems and drainage control. A transportation impact fee, for example, would require all new development, including residential, commercial, and industrial, to pay an "impact" fee to the County. These fees can be assessed in a variety of ways, including: square footage of structures, acreage of land, frontage distance of property along roadways, number of dwelling units, etcetera.

These impact fees as positive by existing residents and businesses, since "new" development is to some extent held responsible for the required maintenance and improvement costs associated with the increased usage of the County's resources. The other side of the equation can offer a disadvantage for the impact fee's success, given that such fees may be perceived by proposed developers as a disincentive to their developments. This can be a factor if the atmosphere for new development in an area is marginal, as the impact fees would be considered as added cost to any potential developer.

It should also be noted that the Indiana statutes require substantial efforts in order to permit a local government to proceed with the imposition of impact fees. The required efforts include detailed

engineering and financial analyses to document the needed costs and the fair distribution of costs to various users (i.e. residential, commercial/retail, and industrial), and estimated revenue streams.

7.5 Local Taxes

Local Taxes are those that are currently available to be collected by Boone County. They include taxes on real and personal property, County Option Income Tax (C.O.I.T.), and Economic Development Income Tax (E.D.I.T.). Given that the existing transportation funding levels within Boone County make full use of all currently available revenues, "new" tax revenues would only be available by considering raising the rates on existing taxes or by implementing new taxes. These sources for assisting in the funding of the future transportation needs of Boone County should be considered long with all other alternative funding sources.

7.6 Negotiated Development Exactions

Boone County currently negotiates individually with developers to fund new and improved infrastructure within the developments. The County uses the requirements stated in their existing subdivision ordinances to establish the minimum acceptable standards. The fees are used to fund subdivision roads, bridges, sewer systems, drainage facilities, etc. Negotiated exactions have, in the past, been used primarily for improvements within the developments themselves. The exactions are currently being considered by the County, however, to extend the improvements to the adjacent county roadway network, including nearby intersections, as well. The impact of new developments on the local infrastructure *outside* the developments themselves can, in some cases, be substantial and must be considered for any new development. The participation of the development community in the improvements outside the developments can be required, but often leads to inconsistent results. While the concept of new development paying its own way is readily acceptable as both fair and desirable by those outside the development, the exaction of improvements without an overall coordinated system of improvements may be irrational. The major question becomes: What is the new development's fair share? An associated issue is whether other taxpayers who also benefit from the improvements (and the increased tax revenue as well) should pay a share of the costs. Both issues are legitimate and must be considered.

7.7 Summary

The ultimate answer to funding for improvements must consider the overall needs of the communities involved and the County as a whole. The intent of the thoroughfare plan is to establish those "overall" needs and their anticipated costs. The choice of funding sources will depend greatly on the economic climate for both the existing and new development within the county. Decisions

about specific funding for future projects will necessarily need to be made on the basis of the conditions at the time the improvement is implemented. A plan should be developed, however, for funding the immediate, short term needs as identified in the five (5) year Transportation Improvement Plan, or T.I.P.

Glossary: Definition of Terms

Functional Classification

Interstate/Freeway - Multi-lane divided highway having a minimum of two lanes for exclusive use of traffic in each direction and full control of access and egress.

Major Arterial - Signalized streets that serves major through movements between important centers of activity in a metropolitan area and a substantial portion of trips entering and leaving the area.

Minor Arterial - Signalized street facility that connects and augments the principal arterial system and places more emphasis on land access than does the principal arterial.

Major Collector - Provides for traffic movement between arterials and local areas with direct access to abutting property.

Minor Collector - Provides for traffic movement to Major Collectors, collecting traffic from local streets with direct access to abutting property.

Local Streets - Provides for direct access to abutting land and for local traffic movement.

Traffic Terms

Annual Average Daily Traffic (AADT) - The total traffic volume passing a point or segment of a highway facility in both directions for one year divided by the number of days in a year.

Average Daily Traffic (ADT) - The total traffic volume during a given time period, in whole days, less than one year divided by the number of days in that time period.

Capacity - The maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions, usually expressed as vehicles per hour or persons per hour.

Ideal Conditions - Characteristics for a given type of facility that are assumed to be the best possible from the point of view of capacity, that is, characteristics that if further improved would not result in increased capacity.

Level of Service - Qualitative measure describing operational conditions within a traffic stream, generally described in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Peak Hour Factor - The hourly volume during the maximum volume hour of the day divided by the peak 15-min rate of flow within the peak hour; a measure of traffic demand fluctuation within the peak hour.

Roadway Conditions - Geometric characteristics of a street or highway, including the type of facility, number and width of lanes (by direction), shoulder widths and lateral clearances, design speed, and horizontal and vertical alignments.

Traffic Analysis Zone (TAZ) - Units which form the basis for analysis of travel movements within, into, and out of a geographic location or specific transportation facility.

Home-based Work Trips - One way movements of travel with the home and the place of work as the origin or destination.

Home-based Non-work Trips - One way movements of travel with the home as one end of the trip and something other than work, such as shopping or school, as the other end of the trip.

Non-home-based Trips - One way movements of travel with the home as neither the origin nor destination, i.e. work to school.

Annual Growth Rate - Percentage difference in the number of vehicles as observed over more than one year, divided by the number of years. Typically calculated from existing data and utilized to analyze future vehicle traffic volumes.

Growth Scenario - Set of possible growth trends for the area based on issues such as land use, traffic growth, and anticipated development.

Thoroughfare Plan - Coordinated plan for future transportation needs containing recommendations and prioritization for improvements to transportation deficiencies.

Set-backs - Specified distance set to achieve a specified width which separates any building facility from the roadway corridor.